REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application. Applicants would also like to thank the Examiner for the courtesies extended during the telephone interview on September 26, 2007.

As suggested by the Examiner, independent Claims 7, 15, 22 and 24 have been amended so that they are more clearly directed to a practical application to overcome the rejection under 35 U.S.C. §101. In particular, the independent claims recite that the quantum algorithm is for searching elements in a database, and that the output vectors from the interference subsystem represents the elements searched in the database. In addition, the independent claims have been amended to recite that a processing device implements the quantum gate for running the quantum algorithm for searching the elements in the database.

The processing device is best illustrated in FIG. 8. The entanglement subsystem is represented by section **I-a** in FIG. 8 for performing an entanglement operation over components of the linear superposition vectors for generating components of entanglement vectors. The entanglement subsystem comprises a command circuit **[HB14 in FIG. 8]** for generating a plurality of logic command signals **[Vc1, …, Vc8]** encoding values of the binary function corresponding to the first basis of vectors.

The entanglement subsystem also comprises an array of multiplexers **[HB-13 in FIG. 8]**, each being driven by a respective logic command signal **[Vc1, …, Vc8]** and receiving as input a plurality of signals **[O11, …, O82]** representing components of a

linear superposition vector corresponding to the second basis of vectors having the first *n* qubits in common, and outputting for each superposition vector **[O11, …, O82]** corresponding signals representing components of an entanglement vector **[Vo1, …, Vo8]**.

Each component of the entanglement vector **[Vo1, …, Vo8]** corresponds to a respective vector of the second basis of vectors and is equal to the corresponding component of the respective superposition vector if the binary function is null in correspondence to the vector of the first basis of vectors formed by the first *n* qubits of the respective vector of the second basis of vectors, or the opposite of the corresponding component of the respective superposition vector if the binary function is not a null in correspondence to the vector of the first basis of vectors formed by the first *n* qubits of the respective vector of the second basis of vectors.

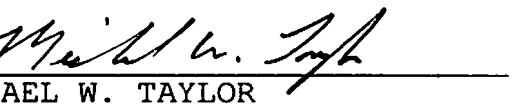
The processing device comprises an interference subsystem **[I-b, I-c in FIG. 8]** for performing an interference operation over components of the entanglement vectors for generating components of output vectors.

An advantage of the processing device is that the entanglement subsystem does not multiply a superposition vector for the entanglement matrix U_F, but generates components of an entanglement vector simply by copying or inverting respective components of the superposition vector depending on values of the function *f(.)*. This allows a relevant reduction of the number of multiplications with respect to known methods, and can be carried out using an array of multiplexers as in the claimed invention.

The Applicants submit that the amended claims overcome the rejection under 35 U.S.C. §101. The specification has also been amended to corrected noted grammatical errors.

In view of the amendments to the claims and the remarks provided herein, it is submitted that Claims 7-30 are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,



MICHAEL W. TAYLOR
Reg. No. 43,182
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330